

BOZEMAN, (N.)

With Compliments of the Author

# RENAL TENESMUS

BY

NATHAN BOZEMAN, M.D.

SURGEON TO THE WOMAN'S HOSPITAL, NEW YORK

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*Reprinted from THE MEDICAL RECORD, August 4, 1888*

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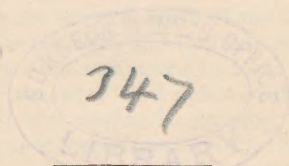


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## RENAL TENESMUS:

### A RESULT OF CHRONIC CYSTITIS AND URETERITIS; SUCCESSFUL TREATMENT BY KOLPO-URETERO-CYSTOTOMY AND INTRAVAGINAL DRAINAGE COMBINED WITH ELEVATION AND SUPPORT OF THE UTERUS AND OVARIES.<sup>1</sup>

I READ before the New York State Medical Association, September 27, 1887, a paper entitled, "Chronic Pyelitis; Successful Treatment by Kolpo-uretero-cystotomy, Irrigation of the Pelvis of the Kidney, and Intravaginal Drainage."<sup>2</sup> In this communication I showed that the vesical orifice of one of the ureters could be exposed by making an opening at the ureteral angle of the trigone of the bladder on the affected side, and that disease of the renal pelvis could be treated and cured by local means. In order to catheterize the ureter and pelvis of the kidney, the anterior wall of the vagina is exposed, in the supported knee-elbow or left lateral position, by the use of my dilating speculum and perineal elevator; the upper border of the artificial opening is then elevated by means of a tenaculum, and the vesical mucous membrane containing the orifice of the ureter is thus rolled out into the vagina. In this way we are enabled to guide a flexible catheter into the ureter, and thus to avoid all injurious probing of the bladder. By injecting warm water, or a solution of bichloride of mercury (1-20,000), through the catheter with a small syringe, the pelvis of the kidney is gradually filled. Distension of the organ gives rise to a peculiar

<sup>1</sup> Read before the Section on Gynæcology of the American Medical Association, May 10, 1888.

<sup>2</sup> Transactions New York State Medical Association, vol. iv., 1887. American Journal of the Medical Sciences, March and April, 1888.

pain, which serves as a guide as to the quantity of fluid which should be injected. When the water is allowed to escape, it brings with it pus, blood, and calcareous detritus, if these irritating substances are present. The injection should be repeated every two or three days or oftener, according to circumstances, and the irrigation continued until the washings are free from sediment.

In the paper referred to I further showed the effect of this method of treatment upon obstruction of the urethra and cystitis, which are commonly associated with the pyelitis. The opening in the bladder, by affording physiological rest and drainage of this organ and the urethra, leads to the subsidence of the inflammation or irritability of the mucous membrane of both structures, and to the atrophy of the thickened muscular walls. The bladder being thus kept continually empty through intravaginal drainage, offers no resistance to the entrance of the urine as it comes from the ureters, and there is no longer a tendency to its reflux toward the kidney during expulsive efforts of the bladder. Physiological rest and drainage of the ureters and pelves of the kidneys, as well as of the bladder and urethra, consequently follow the operation. I also described several forms of intravaginal and vulvo-vaginal drainage instruments, which, by collecting the urine in a satisfactory manner and making the patient comfortable, free, in great part, the operation from its chief objections; to wit, the presence of accumulated urine in the bladder and vagina, and dribbling from the vulva.

At this time I had treated two cases of pyelitis, both of which were cured. I have since done kolpo-cystotomy and kolpo-uretero-cystotomy eight times.<sup>1</sup> Having thus

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<sup>1</sup> I have now performed thirteen operations in all, combined with intravaginal drainage—two of kolpo-cystotomy and eleven of kolpo-uretero-cystotomy. Two of these operations were for urethrocele and cystitis, one was for left pyo-nephrosis with dilatation of the ureter, one for left pyelitis with sacculation of the ureter, three were for pyelitis with dilatation of the ureter, and five for renal tenesmus, without dilatation of the ureters, or pelves of the kidneys. §

a ready means of access to the bladder, ureters, and pelves of the kidneys, I have learned, by observation and experiment upon the living subject, some new and important facts concerning the diseases of the upper urinary organs in women.

**ANATOMY AND PATHOLOGY.**—In presenting the results of these investigations, I have selected as my subject “Renal Tenesmus,” a frequent result of chronic cystitis and ureteritis, in contradistinction to pyelitis, the usual result of urethrocele, cystitis, and ureteritis. It is the most characteristic symptom of the class of cases of which I wish to speak. I have chosen this symptom rather than a pathological condition, as I wish to make it prominent, because it is the first and frequently the only indication of the gradual extension of urethral and vesical disease to the ureters and pelves of the kidneys. From the peculiarity and wide range of the group of symptoms embodied in the use of the term renal tenesmus, it is liable to be confounded with pyelitis, with which it is closely allied. I mean to designate by this term a distinct manifestation of morbid irritability, without pathological evidences of inflammation other than that of pain. The distinction between it and pyelitis, resulting, to a certain extent, from like causes, cannot, I conceive, be too sharply drawn.

Here, as in other parts of the body, the progress of disease is inward—from organs communicating directly with the exterior of the body and exposed to injurious influences from without to those in more sheltered positions in the interior. It is true that an abnormal condition of the urine sometimes leads to the formation of renal calculi, or the ureters and pelves of the kidneys may be pressed upon by abdominal tumors, be the seat of a new-growth, or be implicated in disease of neighboring organs, and in these conditions renal tenesmus may occur as one of the symptoms; but as I have approached its study from the urethra and bladder, I will at present consider it only in its relations to disease of the upper urinary passages following affections of the urethra and bladder.



That an inflammation of the mucous membrane of the urethra and bladder should extend to the vesical extremity of one or both ureters is not surprising. The mucous membrane lining the ureters is continuous with that of the bladder, and the ducts traverse the vesical wall for an inch and a half. It is therefore probable that in an acute cystitis, preceded or not by urethritis, the vesical part of the ureters rarely escapes. As a rule, when the inflammation of the bladder subsides the ureteral mucous membrane returns to a normal condition. But if urethrocele should coexist, or the walls of the bladder should become hypertrophied, or there should be distortion of a ureter arising from the pressure upon it of a displaced uterus or ovary, or both, or of pelvic growths of any kind; why, then, the disease of this portion of the duct is not only liable to continue, but it will sooner or later extend to the pelvis of one or both kidneys, under the form of pyelitis, or of renal tenesmus.

Cystitis more or less localized in the base of the bladder, complicated by ureteritis, is a more obscure but highly interesting condition. The cystitis commences as a local or general inflammation, and afterward becomes confined to one locality in consequence of the retention of residual urine due to sacculation of this part of the bladder. Pouches in the base of the bladder may result from irregular thickening of its muscular coat or from distortion of the vesico-vaginal septum, in consequence of the presence of cicatricial bands and contractions in the vagina, or, as I have more frequently observed of late, from fixation of the uterus in an abnormal position. There is frequently, in these latter cases, lateral displacement of the uterus, and the cervix is drawn upward and outward toward one or the other side of the pelvis, carrying the vesical wall with it and becoming there more or less fixed. In this way is produced a funnel-shaped pouch, the apex of which corresponds to the attachment of the cervix to the bladder. A fold in the vesical wall also occurs in cases of backward displacements of the uterus, especially in well-marked



retroflexions with inclination of the fundus to one or the other side of the pelvis. The bladder is attached to the anterior aspect of the cervix uteri along a line about an inch in length. When the fundus uteri sinks into Douglass' cul-de-sac and the utero-vesical pouch of the peritoneum is thus effaced, the highest part of the attachment of the uterus to the bladder is drawn backward, the lowest is displaced forward by the cervix, and the superior wall of the bladder approaches the base. In this way, instead of the regular and rounded form of the cavity of the bladder, at this point is produced a more or less acute angle, the apex of which corresponds to the highest point of the utero-vesical attachment, and consequently the deepest and narrowest part, to the side toward which the uterus is inclined. Frequently, these folds and distortions of the vesical walls are very distinct, and the artificial opening in the bladder, the result of the operation of kolpo-uretero-cystotomy, affords an excellent opportunity for the study of the mechanism of their production. One of the ureters may empty into a pouch produced in some one of these ways, and thus the inflammation may extend to its lining membrane. The distortion of the bladder at this part also favors the reflux of urine into the duct during expulsive efforts. Fixation of the uterus also, even when the organ is in a normal position, by interfering with the mobility of the bladder, prevents its easy and symmetrical dilatation by the urine and the complete evacuation of its contents. These influences must be studied all the more closely, because, although great irritability of the bladder and renal tenesmus exist, sometimes there is no pus in the urine, and at others only a very small amount. Exacerbations, however, occur, especially during the menstrual periods, when the inflammation extends to the entire vesical mucous membrane and the urine contains large quantities of pus.

Ureteritis may remain localized in the vesical portion of the ureter, or the inflammation, from an increasing urethral, vesical, or uterine lesion, may extend upward

and involve the pelves of the kidneys. In my experience this extension is either preceded or accompanied by dilatation of the ducts. When I have opened the bladder and exposed the ureter, in those cases where the inflammation was confined to its lower part, the lumen of the duct was contracted in consequence of thickening of its coats or of morbid irritability in its entire extent, associated with uterine and ovarian displacements, which there is reason to believe are almost if not always present under such circumstances. In the cases of pyelitis which I have treated, on the other hand, associated also with uterine and ovarian displacements, the ureter was considerably dilated. The cause of the dilatation of the ureter and at the same time the extension of the inflammation is, as I believe, the reflux of the urine bearing septic material from the bladder, arising mainly from the increase of obstruction in the urethra to the outflow of the urine. Thickening and narrowing of the urethra, distinguishing features of urethrocele, by necessitating forcible efforts of the bladder to expel its contents, lead to concentric hypertrophy of the muscular coat and increase the strain upon the ureters, thus causing pyelitis. Partial or general thickening of the muscular fibres of both these structures, the result of overaction in irritable bladders arising from recurrent attacks of cystitis, produces the same effect by increasing the power of the contractions of the bladder. At the same time these contractions occur with greater frequency and longer duration, thus leading to renal tenesmus, as I have observed it in connection with the various forms of uterine and ovarian displacements just described.

CLASSIFICATION.—Now, from the foregoing anatomical and pathological considerations, the chronic inflammatory affections of the female urinary passages may properly be divided into four classes, namely: 1, Urethritis; 2, cystitis; 3, ureteritis; 4, pyelitis. The progress of development is from without inward, and the order of occurrence, as I believe, is the one enumerated.

URETHROCELE AND CYSTITIS.—The following extract from a paper<sup>1</sup> I read before the Medical Society of the State of New York, will show the scope of my views upon urethritis and cystitis at that date, and will serve at the same time to connect these views with those I at present entertain upon the pathology and treatment of the chronic inflammatory diseases of the upper urinary passages belonging to the third and fourth classes of our division, namely, ureteritis and pyelitis, to be referred to again.

“The starting-point of urethral and vesical lesions in the female is to be sought in the lower half of the urethra, closely related in front with the triangular ligament and blending behind with a spongy erectile tissue of the vagina.

“The calibre of the urethra may be transiently narrowed by congestion of its mucous lining, or permanently narrowed by infiltration of coagulable lymph into the underlying cellulo-elastic tissue, which constitutes properly the so-called organic stricture, as in the male, and which, however seldom met with, is liable to the same sequences.

“Infiltration into the spongy erectile tissue outside the urethra, by plastic lymph, is, I believe, by far the most common beginning of the morbid process, whatever be the cause that produces it. This interrupts the stream of urine, either by encroaching on the calibre of the urethra, or by deflecting it beneath the triangular ligament, both cases being attended with more or less dilatation above.

“The next step in sequence is increased functional activity of the urethral muscular coat in overcoming the obstruction to the flow of urine. The result upon its structure is hypertrophy, and this will be of the eccentric type, thickening the urethral walls, while enlarging the calibre. Hence the ease with which large catheters of a proper curve pass at all stages of the disease. False and

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<sup>1</sup> Urethrocele, Catarrh, and Ulceration of the Bladder in Females. See Transactions for 1871.



true hypertrophy here coexist. The true hypertrophy increases *pari passu* with the muscular contraction, and is followed by still greater distortion of the canal at an angle more and more acute as it turns the triangular ligament, and with corresponding contraction of its walls at that point. This mechanical impediment below coincides with the increased weight and volume of the stream of urine above, to put the walls of the urethra on the stretch in the upper part of its course.

"Thus is gradually formed the urinous tumor, which drags down in front the adjacent vaginal wall, appearing as a prolapsus between the nymphæ, and filling up the ostium vaginæ.

"The looser attachment of the urethra to the vagina in the upper part of its course facilitates this result. Such is the condition of the parts to which I apply the term *urethrocele*.<sup>1</sup> Often confounded with cystocele, it is really distinct.

"The arrest and retention of but a few drops of urine, at first, goes on until this may amount to a teaspoonful or more. It is then decomposed in this pocket, becomes alkaline, and by its irritation provokes congestion of the urethral mucous membrane. This congestion, extending to the vesicle trigone above, will bring white glairy mucus into the urine with vesical and rectal tenesmus. Causes favoring this extension are errors in diet, overexertion, and excessive coition. Acute cystitis resulting, first complicates the urethrocele, and is more or less decided according to the gravity of its determining cause. After a few days the active congestion disappears or subsides, with the vesical symptoms, leaving the urethrocele per-

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<sup>1</sup> Urethra and κηλη, a mongrel of Latin and Greek. This word, in the absence of any other to designate the lesion named, I coined and first employed in the description here copied. There is no evidence of the use of this word by writers prior to the date of my paper. Still, recognizing the appropriateness of its first employment, I have used it in this paper in the same sense, believing it to be in strict harmony with the words cystocele and rectocele, and with my present study of the subject.

sistent. A few days, or weeks, or months afterward, similar provoking causes, even slighter than at first, will reproduce the congestion, while extending its area, with a corresponding increase of the severity of all the symptoms. . . . Finally, chronic cystitis overshadows the primitive urethrocele, although this still contributes to exacerbate the long and frightful train of evils.

“The vesical mucous membrane seems to possess almost boundless susceptibilities of irritation, and the higher this ranges, or the greater the area congested by contact with ammoniacal urine, the more is the subjacent muscular coat excited to contractions of abnormal force and frequency. Hence hypertrophy, increased congestion, blindly seeking relief by increased mucous secretion, and more active fermentation of the urine, deposits of its ammoniacal magnesian phosphate, sometimes hemorrhage into the bladder, blood extravasated into the submucous cellular tissue, or abscesses formed there.

“This hypertrophy of the concentric type, although apparently slight in the mucous coat, is more serious in the muscular coat, whose efforts to overcome the urethral impediment and rid the bladder of its acrid contents, keep it growing until it reaches an inch or more in thickness. Autopsies reveal upon its inner surface fascicles of muscle like the interior of the right ventricle of the heart. Its color is deepened by the increase of venous blood in its retarded circulation, and its consistence softened by the same cause. The circular and spiral muscular fibres of the upper urethra are also hypertrophied and overcome the former dilatation of the canal, thus converting the eccentric into concentric hypertrophy of the urethra, which has become firmer to the touch, while its urinous tumor is less defined. . . .

“From the earliest period of vesical hypertrophy, the congestion of the mucous membrane occasions thickening with an cedematous feeling in the bas-fond, and the contraction of its pliant walls under this irritation is even greater than is possible after they have been straightened

out and expanded by progressive thickening. The vesical cavity, moreover, is reduced by the pressure of the anteverted womb upon its superior fundus, which at this early stage gives it a somewhat cylindrical shape.

“On the vagina, the effects of a hypertrophied bladder are seen in the increased firmness of the vesico-vaginal septum, and the congestion and hyperæsthesia of its mucous membrane.

“Ulceration initiates the destructive stage of subacute inflammation or chronic catarrh of the bladder. It will be superinduced by the excessive hyperæmia of small or large patches of membrane, especially at the trigone and bas-fond, and by extravasations of blood into the submucous cellular tissue, caused probably by rupture of minute veins at the time of strong muscular contractions. In either event the mobility or pliability of the mucous membrane is lessened or destroyed by the inflammation which has reached its acme, and which now terminates in sloughing of the membrane (gangrene) perhaps to a very limited extent, or by an abscess opening through it into the bladder. It is also to be considered that the mucous membrane, rendered friable by previous inflammation, and thrown into irregular folds, may tear when it can no longer stretch under the powerful grasp of the hypertrophied muscular coat. This accident will occur the more readily on account of the anteverted position of the womb, which, I believe, always exists, and the pressure of which may explain the greater proneness to extensive ulceration of the female bladder, as averred by our morbid anatomists.”

TREATMENT.—In further consideration of the methods and objects of physiological rest, I am led to regard all four of the inflammatory diseases of the urethra, bladder, ureters, and kidneys named as so many stages of the same pathological process. In short, if it were possible to cure the initial acute inflammatory lesions of the urethra and bladder, which rapidly become chronic, before the more internal organs are involved, the diseases of the ureters and



pelves of the kidneys, thus arising from continuity of structure, might be almost, if not entirely, avoided. Hence the great importance of recognizing early commencing urethrocele and cystitis, and treating them promptly, for, if neglected long, the upper urinary passages will surely suffer sooner or later in the order of sequences previously indicated.

**KOLPO-CYSTOTOMY.**—Kolpo-cystotomy, to secure physiological rest of the urethra and bladder, is undoubtedly the operation indicated for the relief of cystitis coexisting with urethrocele when the ordinary remedies at our disposal have failed; not dilatation of the urethra, nor an artificial opening between the canal and the vagina, expedients at best of questionable utility.

In the early stage of urethrocele, in which there is sacculation of the canal and retention of urine, I advocated on theoretical grounds, in the paper just quoted, the establishment of an opening into the canal from the vagina, a procedure which I called "tapping of the urethra;" but I soon saw that the practice recommended possessed no real merit, for the reason that the relief of the urethra afforded by such an expedient would confer little or no immunity upon the bladder against the extension of the inflammatory process to its cavity, and I therefore gave up the idea. Dr. T. A. Emmet proposed a similar operation on the urethra, several years later, which he called "button-holing of the urethra," but from what I have seen of the bad results of this procedure in cases which had been subjected to it by his followers, I would not be inclined to recommend it, for the reason that, when drainage from either the urethra or bladder or both is required, it should be established through an opening at a favorable point in the vesico-vaginal septum, where the opening afterward can be more easily closed, and injury of the functions of the urethra be entirely avoided. A large opening made here gives relief to both urethra and bladder by putting them in a state of physiological rest, and while they are being thus cured the ureters and pelves of the kidneys are guarded

against further strain and the risk of commencing disease.

The practice of making an opening into the bladder as a means of treating cystitis is itself of comparatively recent origin, but it is recognized generally by the profession as of great practical value. It has, however, been restricted in its employment for the want of suitable forms of intravaginal drainage, by which alone the beneficial and legitimate results of the procedure can generally be obtained. I was the first in this country, as I believe, to treat successfully chronic cystitis by kolpo-cystotomy, which I did in my private hospital in New Orleans, in 1861. My first case was one of ulceration and concentric hypertrophy of the bladder coupled with urethrocele. The mucous coat of the bladder was thickened and redundant, and had a low grade of vitality. It was exposed to great tension on account of the violent and irregular contractions of the muscular coat. From its friable condition, no doubt, it readily became fissured and ulcerated, as was shown by the very minute disintegrated particles discharged through the urethra, which I recognized from time to time with the unaided eye. The same pathology and mechanism of the walls of the bladder will serve to explain the occurrence of gangrene and perforation, not only of the mucous but of the muscular coat as well, in bad forms of recurrent cystitis, a case of which I could here cite if time permitted.

The very large opening, nearly the size of a silver dollar, which I finally made in the vesico-vaginal septum of my case referred to, afforded full and free vesical drainage, and within one year all the diseased structures were completely cured by it, and the artificial fistula closed. The cause of failure to get the good effects of this procedure, in the hands of most surgeons who have employed it since, I am convinced, is because they do not make a sufficiently large opening in the bladder.

To illustrate some of the important objections to the latter practice I will cite here a typical case—Mrs. S——,

of Ohio, aged thirty-two, who recently came under my care—in which the initial stages of urethrocele and cystitis were completed after six years, with the development, as is believed, of ureteritis in the right side, in the regular order of sequences. The operation of kolpo-cystotomy was performed by one of the ablest gynæcologists of New York, but, notwithstanding his acknowledged skill, the disease was only ameliorated for a time, resulting no doubt from the smallness of the opening he made and his failure to secure perfect vesical drainage. The patient, in spite of his kolpo-cystotomy, after five years of further development of sequences (April 11, 1888) was admitted into my service in the Woman's Hospital, presenting all the terrible consequences of renewed and perpetuated sufferings, with blighted hopes and ceaseless dread of death from unknown causes. I found the fistula made for drainage five years before, situated a little to the right of the mesian line and very near the cervix uteri, a mere longitudinal slit through the thickened and contracted vesico-vaginal septum. It would about admit a No. 10 bougie, and through it protruded a small knuckle of the thickened vesical mucous membrane. The urethra had gone through all the stages of urethrocele, from an attack of urethritis occurring four days after marriage, and the bladder was in a state of concentric hypertrophy with a retaining capacity not exceeding three ounces of water. The patient says that she did not experience any real benefit from the operation she underwent until about six months afterward, when she got out of bed and began to walk about, attributed properly by her to a free escape of the urine, in obedience, of course, of the law of gravity. The most of the symptoms in her right side from this time on continued to improve. But this amelioration of her sufferings was only of short duration. Pains soon began in the left groin and lumbar region, and they radiated down the thigh to the knee and foot, and came on in paroxysms not unlike those of renal colic. At the end of three years (two before admission into the hospital),



though relieved almost entirely of her sufferings in the right side, the paroxysms of pain in the left had already become more frequent and severe in character, which were often followed by free discharges with the urine of thick and offensive pus. This condition of things continued to grow worse and worse until she entered the hospital. She had a bad form of retroflexion and fixation of the uterus. Notwithstanding her varied sufferings of eleven years' standing, greatly aggravated no doubt from the last-named cause, I found her to all appearances in a state of robust health. But she was nervous and unable to sleep, results no doubt of the increased frequency and severity of the pains in her urethra, bladder, and left side, combined with the irritating effects of the constantly escaping ammoniacal urine. The treatment I proposed in the case was the correction of the displaced uterus and the successful establishment of intravaginal drainage, two most essential steps, I conceived, and without which I did not think it possible that any good could be accomplished toward the relief of the sufferings described.

Here the pathology and obstacles to perfect vesical drainage were not unlike those usually found in certain forms of chronic cystitis in the male subject, resulting from old strictures of the urethra, and enlargements of the prostate gland. These two diseases, as is well known, bear a direct relation to dilatation of the ureters and surgical kidneys, which are usually rapid and certain in their developments; but they are no less constant and uniform in the production of their sequences than were found to exist in the case just cited, resulting from urethrocele and cystitis.<sup>1</sup>

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<sup>1</sup> June 30th. Progress proved necessarily slow in my first efforts to restore the displaced uterus and establish satisfactory drainage, owing to the greater immobility of the organ, and consequently the greater angle to be overcome in the adjustment of my utero-vesical support than I supposed in the outset of the treatment. Notwithstanding these obstacles, however, and the restiveness of the patient, the gradually increasing mobility of the uterus and the daily improved state of her health encouraged me to persevere.

Matters thus went on until finally I became convinced that the old

From all this, therefore, it will be seen that I advocate and recommend for the successful treatment of urethrocele and chronic cystitis, alone or jointly, an opening in the vesico-vaginal septum between the orifices of the ureters, to secure beyond question physiological rest—the opening to be the size of a silver half-dollar to that, even, of a silver dollar, according to the advanced stage of the disease and the time it is desired to keep the structures at rest. This is to be coupled now, of course, with my system of intravaginal drainage, to protect the raw edges of the wound and the vaginal tract from the evil effects of the urine and to guard the patient against stillicidium. The distinguishing features of my procedure I have now clearly set forth; they are, I know, in contravention to the generally accepted views of gynecologists.

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fistula, from the smallness of its size, and the partial closure of it nearly all the while by the existing teat-like protrusion of the vesical mucous membrane, were obstacles even more grave than those just mentioned. These obstacles, to my mind, accounted for the former persistency of the pains in the right side, and afterward the renal colic-like pains in the left. A more minute and careful examination at this juncture of the pathological anatomy of the vesico-vaginal septum, especially in the locality of the vesical orifice of the left ureter, fully confirmed my impressions upon these points. Here I found the area of the structure contracted down to one-fourth at least of its original dimensions. It was thickened in about the same proportion, hard, resisting, and exquisitely sensitive under pressure of the finger and depressor. From this further study of the parts, I thought it possible that, from the incompleteness of the relief—after the operation of kolpo-cystotomy five years before—the hypertrophy of the muscular coat of the bladder had itself not only gone on increasing in the locality indicated, but that the original cystitis had been followed here by ulceration of its mucous coat as well, thus causing in this way abnormal relations of the parts, and mechanical obstruction to the outflow of urine from the corresponding ureteral orifice. I, therefore, decided to perform left kolpo-uretero-cystotomy, in order to give a direct outlet to the implicated ureter, which I did in the supported knee-elbow position, on April 27th, in the presence of several physicians and the house-staff of the hospital. I made as large an opening as the restricted limits of the diseased structures would permit, leaving a longitudinal strip of tissue between the old and new openings, the breadth of the index-finger. I found the thickness of the structures fully five-eighths of an inch, and an artery in the upper border of the opening that spouted blood almost equal to a divided radial. Only by the quick application of a long pair of compression-

URETERITIS AND PYELITIS.—I have referred particularly in the preceding remarks to the teachings of my first operation of kolpo-cystotomy, in 1861, and to those of the recent case cited, because they have a direct bearing upon ureteritis and pyelitis, belonging to the third and fourth classes of our division. They show the tenor of the line of work that I have pursued during all the succeeding years of my experience, which has finally led me to diagnosticate, differentiate, and treat successfully the two last named diseases. This has been done by a careful study of certain groups of symptoms and physical signs characterizing these and other lesions sketched in the first part of this paper. I will again briefly point out the more important differences between ureteritis and pyelitis. Ureteritis indicates its presence by congestion and thickening of the mucous lining of the vesical portion of the ureter,

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forceps was the patient saved from excessive loss of blood. The orifice of the imprisoned ureter could not now be discovered, nor could the morbid changes of the muscular and mucous coats of the bladder around the newly made opening be carefully examined, owing to the free oozing of the blood. Suffice it to say, that a few continuous catgut sutures in the border of the fistula at the bleeding points, and the application of a small pad moistened in a twenty per cent. solution of subsulphate of iron, controlled effectually the hemorrhage. In this way I put the patient in the best possible condition for renewed progress in treatment by intravaginal drainage, combined with elevation and support of the uterus. As might have been expected from a fresh wound in the parts, there was for eight or ten days considerable increase in discomfort of the patient, arising mainly from flooding of its raw edges with alkaline urine. But, nevertheless, the cavity of the bladder under the new order of things soon began to enlarge, and the thickness of the vesico-vaginal septum to perceptibly diminish, thus showing that the mucous coat of the bladder had not undergone ulceration. It was not until June 3d, thirty-six days after the operation, could I find the affected ureteral orifice, and explore the tube up to the pelvis of the kidney. This I did first with a delicate probe for a few inches, and then with a French catheter No. 8. The result was the escape through the catheter of ten drachms of pus and urine, white, thick, and cloudy, from a point not exceeding one inch and a half up the ureter. The pelvis of the kidney and ureter were then irrigated with a solution of bichloride of mercury, 1-20,000. Again, June 5th, two ounces of a similar fluid were drawn off from a point about the same height in the ureter, containing a larger amount of pus and albumen with acid reaction, and specific gravity of 1.019. This exploration showed that when the eye of the cath-



and by diminution of its lumen, coupled at times with intense morbid sensibility. Pyelitis evinces a thickening or hypertrophy of the walls of the ureter in some part or the whole of its extent, with partial or complete dilatation, coupled with no greater sensibility usually than accompanies the lodgment of a similar sized instrument in the male urethra for the relief of a stricture.

I am sorry that time does not permit me to report all of my cases of these two classes, in order to illustrate and substantiate more fully what I have said. Each presents certain points of interest, but at the same time there is a uniformity in the principal features of all. The case of Mrs. B——, already related in the journal cited, I regard as typical of my fourth class, where dilatation of the ureter had occurred and the inflammation had extended to the pelvis of the kidney.

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ter was carried into the pelvis of the kidney and irrigation commenced, it had to be withdrawn three inches from the kidney before the fluid would begin to run through it, thus proving that the sacculation was not in the pelvis, but low down in the ureter. Still again, on June 8th, with the same precautions of introducing and withdrawing the catheter through and back to the dilated portion of the ureter, three ounces of fluid of the same character were taken away, and irrigation made. The fluid drawn off this time was acid, contained pus, epithelia, and some albumen, but no casts or crystals. The catheter, now left in the ureter five hours, showed that the secreting capacity of the left kidney was equal to, if not greater than, that of the right. The temperature next day, accompanied by nausea and vomiting, rose to 103.5° F., but it gradually came down, and the irrigation was resumed, though at longer intervals. The improvement of the parts was slow but progressive to the date of this note, when the patient left the hospital to return home to recuperate her strength for future treatment, when the hospital opens in the autumn.

*Remarks.*—The facts brought out in this foot note, scarcely need I say, all tend to prove the correctness of my statement in the outset, namely, that the opening in the bladder made by the surgeon who first treated the case was too small, and that to his imperfect vesical drainage is properly referred the continued development and progress of the diseases which I have found to exist in the upper urinary passages. They also forcibly illustrate the development in the same case of all four of the classes, or stages, previously described.

Thus have I diagnosed in this case sacculation of the left ureter, with obstruction just above the orifice to the outflow of the retained secretions, without perceptible disease of a serious nature in the corresponding kidney, resulting from concentric hypertrophy of the mus-

**KOLPO-URETERO-CYSTOTOMY.**—By kolpo-uretero-cystotomy, described in my paper on the treatment of chronic pyelitis, and now advocated and recommended for the successful treatment of renal tenesmus, I mean the making of an opening through the vesico-vaginal septum not smaller than a silver half-dollar, and having specific and close relation to the outlet of the affected ureter and kidney. When of this size and in this situation, it insures a free and direct escape of the secretions from both organs into my intra-vaginal drain, from which a state of the most complete physiological rest is obtained, with the best possible aseptic surroundings of the newly-made wound. In this way the greatest comfort is conferred upon the patient in any position she may choose to take for sleeping, sitting, or walking.

While it may seem to some, with no experience in such matters, that my recommendations for the establishment of the large openings in the two procedures outlined shows a needless sacrifice of tissue, with which I have indeed been charged by writers with regard to the first, yet, nevertheless, I am prepared to maintain the correctness of the

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cular coat of the bladder, and constriction within its grasp, probably, of the corresponding portion of the affected ureter.

Whatever may be the final result of the treatment in the case, now cut short for three months, I can at least claim thus far that a correct diagnosis has been reached, and that the domain of gynaecology in this direction has been extended. It remains yet to be seen what the exact limit of such work in this new field of investigation may be, and how much further general surgery can be depended upon for the relief of such sufferings by the sacrifice of an endangered or diseased kidney, approached from the opposite direction through the resources of lumbo-nephrectomy.

One is here naturally led to ask, of what value or practical use would attempted catheterization of the ureter for diagnostic purposes have been in such a case, made through the urethra with dilatation, or, as to that matter, "free handed" without dilatation, for which it has been claimed that dexterity and supreme skill are all-sufficient? For my part I answer that it took me thirty-six days to find the ureteral orifice, and I had the advantage, too, of a window in the vesico-vaginal septum through which I could examine and study well the inside of the bladder. I possessed in the procedure also a ready method for treating the existing inflammatory lesion in the ureter, besides being able to guard against acute attacks of cystitis.

practice on the basis of the good results I have obtained by them, and from having seen very defective vesical drainage and the evil consequences therefrom, when even larger fistulous openings existed than I have advocated, resulting from parturition. It is well to bear in mind that I operate either in the supported knee-elbow or left lateral position, using my bilateral dilating speculum, which spreads out the septum, very elastic in character, and the opening when made in it in this state of tension naturally seems large. From these circumstances it may be readily inferred that the loss of tissue is always more apparent than real.

RENAL TENESMUS.—This brings us now to the study of renal tenesmus as a result of chronic inflammation of the mucous membrane of the vesical portion of the ureters, the main object of this paper. By renal tenesmus I mean violent and painful contractions of one or the other ureter and corresponding pelvis of the kidney, with marked tenderness or soreness under pressure of the latter organ, proceeding from morbid irritability of both structures. The pains occur in paroxysms, which vary in frequency, duration, and severity in different cases according to the stage of the preceding ureteritis and the extension of the lesion to one or both sides. As a rule, it is confined at first to the groin on one side of the body, and afterward to the corresponding lumbar region. In the more severe attacks the pain, besides being violent in these situations, radiates to the hip, the outer and inner sides of the thigh, the knee, leg, and even to the toes. Cramps of the muscles of the lower extremity on the affected side also occur in these severe paroxysms. In the well-marked cases, attacks of this sort come on daily, or even several times a day. They are most frequent and severe during the menstrual periods. The patients describe them as occurring most often during the night. They awake with a pressing desire to urinate; the emptying of the bladder is accompanied by more or less pain and spasm, and its evacuation is followed by a cramp-like pain ascending along the course of the ureter to the kidney, and radiating

to the lower extremity. The patients sleep, as a rule, on the affected side, with the face turned toward the pillow, and it is the habit of many to draw the opposite thigh up over its fellow against the abdomen. The pain is excited in the early stages by the marital relation, which in nearly all cases becomes intolerable in the advanced stages of the disease.

Other symptoms are associated with the renal pain and the disturbance of the functions of the bladder. Anorexia, nausea, and vomiting are almost always present, especially during the menstrual periods, and as the attacks of vomiting are generally long continued, the vomited matters become stained with bile. Jaundice even is not an uncommon result. Hysterical symptoms form a marked feature of most of the cases. The patients start at the slightest noise, become despondent, cry, and laugh without sufficient cause, and sometimes have well-marked hysterical convulsions followed by a period of unconsciousness. Finally, in the advanced stages of the disease, after years of almost ceaseless pain, when dyspepsia, loss of appetite, nausea and vomiting, torpidity of the liver, constipation of the bowels, and yellowish tinge of the complexion shall have supervened, the general aspect of the subject is that of inanition or starvation, from which, with continually increasing physical and mental sufferings, death puts an end to the roll.

That the pains which I have described as constituting renal tenesmus are referable to ureteritis, beginning in the lower part of the ureter as an extension of cystitis, and are due to spasm of the affected ureter and pelvis of the kidney, appears not only from their situation and character, but also from the following physiological signs and observations.

Tenderness over the kidney on the affected side is usually present. Frequently I find a small area of great sensibility midway between the crest of the ilium and the last rib. There may also be tenderness on pressure in the groin. More important and characteristic than either of



these signs is great tenderness at the ureteral orifice, and along that portion of the ureter which lies in the vesico-vaginal septum. The slightest pressure upon this part of the anterior vaginal wall on the affected side causes pain, which frequently ascends along the ureter to the groin and kidney. This, together with the sensitiveness of the urethra and the bladder, furnishes an explanation of the dyspareunia which is so commonly present in these cases. Pressure with even a few pledgets of dry cotton also gives rise to pain in the ureter. Looking back over my experience, I recognize these patients as those who were unable to tolerate columning the vagina with dry cotton for displacements of the uterus and ovaries—a practice which I have pursued nearly twenty years.

Paroxysms of renal tenesmus may also be excited in a most striking manner by moderately distending the bladder with warm water. The pressure of the water, when sometimes only a few ounces are used, causes an irresistible desire to urinate, which, if not promptly relieved, is followed by the pain along the ureter and in the kidney, even in the corresponding hip and lower extremity down to the ends of the toes. The patients recognize the pain produced in this way as the symptoms which have been their chief source of suffering. The attacks of renal tenesmus brought on by either of these procedures may last for several hours or days, and are frequently accompanied by great mental excitement and hysterical manifestations. Hence the necessity of caution in adapting these means to the peculiarities of the case.

Corresponding to these clinical facts after a kolpo-uretero-cystotomy is done, we find great sensitiveness and irritability of the bladder and ureter. In the report of my first two cases of pyelitis, I stated that catheterization of the ureter caused but little pain. This is true in a normal ureter, and in some cases of pyelitis with considerable dilatation of the duct; but when pronounced ureteritis exists at or near the vesical orifice of the tube and renal tenesmus is present, the passage of the smallest in

strument gives rise to violent paroxysms of pain. In the normal pelvis distention with fluid occasions moderate pain, identical in character with that we are considering, and the quantity of fluid thus injected becomes a measure of its capacity. When renal tenesmus is present, however, the pelvis of the kidney is intolerant of fluid, and the pain beginning before distention is reached may continue for hours. In these cases, therefore, the quantity of water that can be injected is rather a measure of the irritability of the pelvis than of its capacity.

This view of the causation and pathology of renal tenesmus is further strengthened by the results of treatment. As soon as the proper opening is made at the affected orifice of the tube, and the bladder and upper urinary passages are put at rest, coupled with suitable drainage and support of the uterus, the paroxysms become less frequent and soon disappear altogether.

**DIFFERENTIATION FROM RENAL COLIC.**—The pain of renal colic also depends upon violent contractions of the muscular fibres of the ureter and pelvis of the kidney, and when renal tenesmus is severe there is a close similarity between its paroxysms and those of renal colic. The situation and character of the pains are identical in both, and associated with either there may be a frequent desire to urinate, cramps in the lower extremities, and nausea and vomiting. Both are due to spasm of the muscular fibres of the ureter and pelvis of the kidney; the distinction between them lies in the cause of the contractions. The contractions in renal colic arise from the impaction of a foreign body, usually a calculus in the ureter, causing the urine to collect in and distend the pelvis of the kidney above the seat of obstruction; the contractions which follow are a response to this powerful source of irritation, and the condition of the mucous membrane, whether healthy or diseased, has little to do with their occurrence. In renal tenesmus, however, the irritable condition of the lining membrane, the result of ureteritis, leads to violent contractions of the muscular fibres of the

ureter and pelvis from much slighter causes, as, for example, increased tension of the urine during forcible expulsive efforts of the bladder, or, as happens in the bladder, the presence of the urine itself, especially if abnormal, may excite spasmodic contractions. Dependent upon the difference in causation of renal tenesmus and renal colic, each possesses certain distinctive features. An attack of renal colic continues, as a rule, with only short intermissions, until the calculus escapes into the bladder, and the concretion is afterward generally discovered in the urine; the paroxysms also recur at irregular and usually long intervals. The pain of renal tenesmus is less severe and long continued; it comes on more frequently, and the paroxysms, as we have seen, occur several times a day, and often from the most trivial causes. The most important diagnostic feature of renal tenesmus, however, is the facility with which an attack can be excited. When any doubt of the causation of the pain exists, it may be set at rest by making pressure over the ureter where it lies in the vesico-vaginal septum, or by injecting the bladder with warm water in the manner already described. The distinction, thus easily made, is all the more important, because an error in diagnosis, as I have known to occur, may lead the surgeon to perform lumbar nephrotomy and find no stone in the pelvis of the kidney.

**DIFFERENTIATION FROM PAINS IN THE OVARIES AND TUBES.**—In the milder cases of renal tenesmus, where the pain is referred to the ureter in one or the other iliac region and radiates less frequently to the pelvis of the kidney, the pain may be ascribed to ovarian neuralgia or disease of the ovary and Fallopian tube. This error is all the more likely to occur because at times there is no pus in the urine, and hysterical symptoms commonly referred to ovarian irritation may be highly developed; the patient may also describe the pain vaguely as being in the side, as often happens, and her sufferings may be intensified during the menstrual periods. That this error in diagnosis is not a mere theoretical possibility will be seen by the histories of

two cases which I will presently report. In one of them the ovaries and tubes were removed a year ago by a distinguished laparotomist of New York ; in the second case a Tait's operation was urgently recommended by another. In order to ascertain the cause of the pain the urine should be frequently examined, especially at or about the menstrual periods, the condition of the bladder should be inquired into, and the situation and character of the pain carefully noted ; if then any doubt remains, pressure over the ureter should be tried and the bladder injected with water. The excitation by these means of an attack of renal tenesmus, which the patient recognizes as being identical with the pain she has suffered so long, will at once clear up the diagnosis. May not a more careful and painstaking study of the differentiation between deep pelvic pains, regarded usually as significant of diseases of the ovaries and tubes on the one hand, and the group of symptoms characterizing renal tenesmus on the other, serve to explain the too frequent resort to oöphorectomy as is now believed to be the case by the majority of the profession ?

TREATMENT.—In order to present a clinical picture of our third class of cases, where the inflammation is confined to the bladder and ureter, and is associated with renal tenesmus, I will relate to you the histories of the following cases, together with their treatment :

CASE I.—Mrs. G——, aged twenty-six, a laundress, was admitted into my service in the Woman's Hospital, November 30, 1887. Her symptoms began during her second pregnancy, seven years ago, with pain in the left groin which afterward extended to the corresponding lumbar region. Micturition also became frequent, and she noticed a strong odor and thick deposit in her urine. In 1885, she was under my care for seven weeks. At that time there existed a marked retroversion of the uterus and her urine contained pus. She was treated for the displacement by columning the vagina in the supported knee-elbow position, with ordinary dry cotton ; but was unable to tolerate the required pressure, and left the hospital with-



out having received any benefit. She was also under treatment for nearly two years in the out-door department of the hospital, but did not improve. In the spring of 1887, both of her ovaries and tubes were removed by a laparotomist of New York City. She entirely recovered from the operation, and during the past year has only menstruated twice. Her sufferings were not relieved, but rather increased, by this operation, especially those relating to the bladder and head.

When she was admitted into the hospital in November last, she had then been suffering from great vesical irritability for seven years. For five years she had been obliged to get up to empty her bladder many times during the night, and during the exacerbations of her symptoms, which occurred at the menstrual periods, she was unable to hold her urine longer than half an hour. The evacuation of the bladder was usually effected by violent and painful contractions or cramps. After the small amount of urine which she could retain was expelled, pain would ascend from the bladder into the left groin and continue for a few minutes or half an hour. At first the pain was confined to the left iliac region, running upward from the inguinal ring along a line to the lumbar region. At a later period, when her symptoms had increased in severity, it extended to the groin and lumbar region on the opposite side, and finally to the corresponding hip and down the thigh to the knee. Violent and long-continued cramps of the muscles of the lower extremities frequently occurred during the paroxysms of pain. The position in bed which she found the most comfortable was on the right side. (In this respect the case is exceptional; most of the patients lie on the affected side.) Her appetite was poor, and during the menstrual period she suffered most from nausea and vomiting.

On palpation, a point was found in the left lumbar region where moderate pressure caused the patient to cry out with pain. Vaginal examination disclosed great tenderness at the vesical extremity of the ureter. The

uterus was now retroflexed instead of retroverted as previously existed, inclined to the left side of the pelvis, and immovable. A mass of exudation could be felt in the posterior cul-de-sac, all legitimate results of the operation she had previously undergone for removal of the ovaries and tubes. The urine contained a small amount of pus; otherwise, was normal.

On December 9th I made an opening in the bladder immediately in front of the orifice of the left ureter. The night after the operation the patient slept soundly, the first time, she declared, in two years. About ten days after the operation the ureter was searched for and found with some difficulty on account of the great tenderness of the bladder at this part. Catheterization and irrigation of the ureter and pelvis of the kidney were painful. The injection of only a drachm of water through the catheter caused violent paroxysms of pain, radiating down the corresponding hip, thigh, and leg. Owing to the extreme pain arising from the passage of the catheter, and my failure to find any pus in the pelvis of the kidney, I gave up the practice after a few trials, not deeming it justifiable under the circumstances.

While the patient remained in the hospital her symptoms steadily improved, the paroxysms of renal pain becoming less and less frequent. Owing to the fixation of the uterus, the use of the drainage instrument was less satisfactory in this case than in any I have treated. My utero-vesical drainage support collected the urine fairly well, but, owing to the pain which it occasioned by pressing up the uterus, it could not be worn. A special instrument, made short so as to occupy the vagina in front of the uterus, was tried. This did not cause pain, but collected only a part of the urine. After the patient, however, got accustomed to the presence of the instrument and learned how to manage it better, very good drainage was secured.

The patient left the hospital after having been under treatment about four weeks. I saw her a few days ago.

She was relieved of all her symptoms. She says she is able to do the hard work of a laundress all day, and sleeps soundly at night. When asked if she would prefer to go all her life with incontinence of urine rather than return to her former condition, she answered, "A thousand times."

In the above case the vesical and renal symptoms were well marked, but the hysterical phenomena which, as a rule, form a prominent feature of these cases were absent. In the following case they were well developed.

CASE II.—Mrs. M——, aged twenty-six, was married at sixteen, and has given birth to three children. Soon after marriage she began to suffer from pain in the urethra, and a frequent desire to urinate following sexual intercourse, and at this time she first noticed a thick deposit in her urine. During her first pregnancy, nine years ago, these symptoms became worse, and in the latter months she began to have pain in the right groin radiating to the region of the kidney. These symptoms continued and were aggravated during her subsequent pregnancies. During the early months of her second pregnancy her urine contained blood. For a long time she complained of pain in the head, and suffered from nausea and vomiting during her menstrual periods, at which times all her symptoms were aggravated. In consequence of her sufferings she became nervous and hysterical. Frequently, at the end of a paroxysm of pain in the ureter and kidney, she would have convulsive movements ending in unconsciousness which continued for half an hour or more. For the relief of the pain she became habituated to the use of morphine and chloral, and took large doses of these drugs. About two years ago an abscess formed in the right iliac region. It opened into the rectum, and the discharge continued for about three months, when it ceased. She recovered from all the symptoms referable to the abscess except a dull, aching pain in the pelvis.

The patient was brought to me from Texas by her family physician, for the purpose of having her ovaries re-

moved. His opinion as to the advisability of the operation had also been strengthened by that of a laparotomist of New York, who diagnosed a pyosalpinx. I first saw her on March 15th.

On palpation, a point of tenderness was discovered in the lumbar region over the kidney. Examination of the pelvis in the supported knee-elbow position disclosed the following: The urethra was much thickened, feeling like a hard rounded cord beneath the finger, and the vesicovaginal septum also seemed indurated and resisting. The uterus was prolapsed and inclined toward the right side. A corresponding displacement of the right ovary existed; it was drawn to the right and imprisoned beneath the uterus. Pressure with the finger on the anterior wall of the vagina, over the line corresponding to the course of the right ureter, caused severe pain which radiated along the ureter to the kidney and downward to the hip, thigh, knee, leg, and even to the toes. Pressure over the left ureter occasioned little inconvenience. On examining the urine, it was found to contain a moderate quantity of pus.

A few days after the first examination, in order to support the uterus and ovaries and to gradually free them from their confined positions, I commenced columnning the vagina with dry cotton in the supported knee-elbow position. I introduced a few pledgets of ordinary cotton, employing very gentle pressure, as is my custom at first in cases where the parts are sensitive. After a few trials this plan of treatment had to be abandoned. The presence of the cotton caused the same group of symptoms which were excited by pressure over the ureter with the fingers.

An attempt was next made to wash out the bladder. When I had injected about three ounces of warm water through a small, soft catheter introduced into the bladder, the patient began to complain of pain. The pain soon became very violent, extending, as usual, along the ureter to the kidney on the right side, and down the thigh to the toes. The paroxysm lasted two or three hours, ending in



a hysterical attack followed by a period of unconsciousness.

Failing to benefit my patient by other means, on March 31st I performed right kolpo-uretero-cystotomy. I was assisted by Dr. J. F. Chauveau, of New York, Dr. Joseph Letcher, of Texas, and my son, Dr. Nathan G. Bozeman, who had charge of the patient after the operation. I made an opening in the bladder about the size of a silver half-dollar, immediately in front of the orifice of the right ureter. The vesical wall was found much thickened and the cavity of the bladder contracted. A utero-vesical drainage support was introduced into the vagina; it collects the urine, and by its use the patient is kept almost perfectly dry.

Since the operation, there has been a marked improvement in the patient's condition. She is now entirely free from the attacks of renal pain, is able to sleep all night, and has left off the use of opium and chloral. She can sleep on her left side, which she has not been able to do for two years. Her appetite and general condition have improved, and she is able to go out of doors and take exercise. Nausea and vomiting, which had hitherto been constantly present during menstruation, were absent at her last period, and the exacerbation of her symptoms, usual at this time, did not occur. Owing to the elevation of the uterus and ovaries by the drainage support, even the symptoms referable to these organs have almost disappeared. In short, now, five weeks after the operation, the patient declares she is entirely relieved and wants to return home. She has increased five pounds in weight since the operation. In this case, owing to the marked and rapid improvement in all the symptoms, I decided not to catheterize the affected ureter and kidney, believing this to be unnecessary. The drainage was almost perfect from the beginning.<sup>1</sup>

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<sup>1</sup> The patient continued to improve until May 28th, fifty-eight days after the operation, when she left New York for her home in Texas, having up to this date gained sixteen pounds in weight. The follow-

In order to secure the best results in the treatment of diseases of the bladder and upper urinary passages by the operation of kolpo-uretero-cystotomy, the bladder must be kept free from urine. My practice, as previously stated, is to make the opening about the size of a silver half-dollar. My experience has taught me that an opening in the vesico-vaginal septum of this diameter will contract to the size of the index-finger, depending, of course, upon the degree of hypertrophy the structure has undergone.

But this is not all that is necessary to secure free open drainage and physiological rest of the bladder. The posterior wall of the vagina lies in contact with the fistula and tends to obturate the opening. In the recumbent posture, also, the orifice of the vagina is on a plane about an inch and a half higher than the most dependent part of the posterior cul-de-sac. The urine must therefore first partly fill the vagina and bladder before it can escape from the body. Furthermore, in unmarried women especially, where the perinæum is intact, a small ostium vaginae prevents free egress of the urine. Another cause of retention in cases of fistula was first pointed out by Jobert de Lamballe; to wit, extreme anteversion of the uterus. Here the fundus being displaced forward,

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ing is an extract from a letter to me after her four days' travel in the cars:

"Lampasas, Tex., June 8, 1888. . . . Was sick the first day, but after that got along very well. Did not sit up at all. Had my berth down all the way. Found my family quite well, and delighted to see me looking so well. Have felt real strong since I rested from travelling. Have not felt so well for years. Suffer very little pain anywhere. My friends all think it wonderful that I should have improved so much in so short a time. The instrument is working very well, but the drainage is not perfect, some water seeming to stay in the instrument. . . . I can walk now and sit down with perfect ease; can hardly tell I have the instrument on."

July 16. In a letter of this date from the husband of the patient, he says: "My wife is getting along nicely, and says she will be back in September," that is, for the closure of her fistula.

I have performed three more operations for renal tenesmus, now making six in all, with results equally satisfactory, if not more so, than in the two cases here reported.

it carries the superior wall of the bladder before it, while at the same time the vesico-uterine junction is drawn backward by the cervix. In this way is produced a fold in the bladder, and if the fistula be situated high up, it is more or less completely occluded. From some of these causes, it is a matter of common observation that patients suffering from fistula are frequently able in the recumbent posture to retain almost all the urine in the bladder and vagina—as in a common cavity, so to speak. It is evident, when great irritability of the bladder is present and the urine is not entirely drained off, spasms of the organ will persist, the tendency to reflux of the urine into the ureters will continue, and the group of renal symptoms and complications which I have described will not be relieved. The case of Mrs. S——, referred to in a previous part of this paper, proves this point in a striking manner. Here kolpo-cystotomy, it will be remembered, had been performed for cystitis five years before, from which only imperfect vesical drainage was secured. But little benefit was derived from the operation, distress about the bladder continued, and ureteral and renal complications in the left side developed two or three years afterward. As evidences of the persistence of the spasms and excessive action of the bladder, I found the walls of the latter, five years after the operation, hard, resisting, excessively sensitive under pressure, and about five-eighths of an inch in thickness, with a cavity of scarcely three ounces retaining capacity.

Another and more obvious advantage which follows the use of the drainage instrument is the relief of the discomfort and evil effects of incontinence of urine. It increases the scope of the operation, because without it I would hesitate to open the bladder in all but the graver cases of vesical and renal disease. By its use the patients are made comfortable; they complain of but little inconvenience, and wait with patience until the opening can be closed.

I have made some changes in the drainage instruments

since I described them,<sup>1</sup> the most important of which adapts them for drainage when the patient lies on her side. Drainage is now secured in all positions of the body. At a future opportunity I will give an account of these improvements, and also a modification of the instrument which adapts it to treatment of incontinence of urine in young girls, arising from weakness of the neck of the bladder, together with other practical points resulting from a more thorough study of the subject.

Frequently associated with disease of the bladder and upper urinary passages there are, as we have seen, displacements of the uterus and ovaries. The uterus is generally inclined backward and to one or the other side of the pelvis. The distortion of the bladder near one of the ureteral orifices resulting from the uterine displacement, and in some cases the pressure of the fundus uteri upon the inflamed ureter, tend to keep up the cystitis and to aggravate the ureteral pain. It is therefore important that the uterus and ovaries should be restored to their normal positions. Before the bladder is opened, owing to the tenderness of the urethra and the extreme sensitiveness of the ureter on the affected side, the use of a uterine support or pessary, however soft, is impossible, and in most instances even gentle pressure with a few pledgets of dry cotton cannot be borne. Fortunately, after the opening is made the uterus tends to be pushed forward by the pressure of the abdominal viscera, in order to fill the space formerly occupied by the bladder, and, owing to the rapidly diminishing tenderness of the ureter, the vagina soon becomes more tolerant of pressure.

In order, therefore, to secure the advantages of elevation and support of the uterus and ovaries in combination with drainage of the bladder, the drainage instrument is made thick and rounded at its upper extremity, where it lies in the posterior cul-de-sac beneath the cervix uteri.

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<sup>1</sup> American Journal of the Medical Sciences, March and April, 1888, and Transactions of the Ninth International Medical Congress, 1887.



As a uterine support, its mode of action is similar to that of the dry-cotton column applied in the manner I use it. The instrument lifts up the body of the uterus, stretches the posterior wall of the vagina, and tends to carry the cervix backward. Not resting against the symphysis pubis as does a Hodge pessary, but conforming to the axis of the lower part of the vagina, and sustained chiefly by the perineum and vaginal walls, it exerts an elastic pressure upon the uterus. The instrument consequently yields during sudden movements of the organ, following jars of the body or expulsive efforts of the abdominal muscles. The mucous membrane of the anterior wall of the vagina is applied closely to the concave upper surface of the drainage support, and sinks into the perforations made in it for the passage of the urine. This gives steadiness to the instrument and increases its efficiency as a uterine support. At first the drain sometimes causes discomfort; immediately after the operation it is necessary to use a very small instrument, and exceptionally, as in the case of Mrs. G——, the form of the drain must be modified.

I have found continuous irrigation and drainage to be of great value just after the operation, and my system of intravaginal drainage has been extended to accomplish this. For the perfection of the system in the application of suction I am indebted to my son, Dr. Nathan G. Bozeman, and Dr. William B. Gilmer, who have recently been deeply interested with me in working up the subject of drainage, and have materially contributed to my success by their experimental work. This system of continuous irrigation and drainage is of great practical importance and has a wide range of usefulness in general surgery, but the further consideration of it, together with the several improvements made in my drainage supports, will be the basis of a future paper.

In my paper on pyelitis, so frequently referred to, I explained sufficiently the method of irrigating the kidney. In cases where cystitis and ureteritis associated with renal tenesmus are present, the indications for the employment

of this procedure are not so clear as when the inflammation has extended to the pelvis of the kidney. My experience so far tends to show that physiological rest and drainage of the bladder and affected ureter are all that are necessary when the complication of renal tenesmus alone exists. After the extreme sensitiveness of the parts has subsided, however, the passage of the catheter may be found useful for its tonic effect, as is the case in a similar condition of the mucous membrane of the male urethra; but further experience is needed to settle this point.

Now, a few words about the time which should be allowed to elapse before closing an artificial fistula. All thickening of the vesical walls and tenderness about the urethra, bladder, and ureter must have disappeared. From six to twelve months, as a rule, are required to accomplish these results. Of late I have adopted a useful method of determining this point experimentally. I introduce a large cylinder of hard rubber—one of my intravaginal dilators—which obturates the fistulous opening and keeps the urine in the bladder. If the patient can wear this instrument for a week or two without the occurrence of any distress in the bladder, the opening may be closed at once and the bladder allowed to take on its normal functions.

